



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/650,026	08/26/2003	Yoshihumi Suzuki	501315.20004	6447

7590 03/23/2005

Eugene LeDonne
Reed Smith, LLP
29th Floor
599 Lexington Avenue
New York, NY 10022

EXAMINER

MRUK, GEOFFREY S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 03/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/650,026

Applicant(s)

SUZUKI, YOSHIHUMI

Examiner

Geoffrey Mruk

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8/26/03, 12/18/03</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities:

The term “conductive past” is used in the specification to describe the material used to fill the through holes. The Examiner suggests changing the term to “conductive paste”.

Appropriate correction is required.

Claim Objections

Claims 7 and 17 are objected to because of the following informalities:

The term “conductive past” is used in the claims to describe the material used to fill the through holes. The Examiner suggests changing the term to “conductive paste”.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Claims 1-5, 9-15, 19, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Takahashi (US 6,655,790 B2).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art

Art Unit: 2853

under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

With respect to claim 1, Takahashi discloses an inkjet head (Fig. 1, element 100) comprising:

- a cavity unit (Fig. 1, element 22) formed of a conductive material (Fig. 1, element 2) with a plurality of nozzles (Fig. 1, element 8) and a plurality of pressure chambers (Fig. 1, element 5) in fluid communication with the corresponding nozzles (Fig. 1, element 15); and
- an actuator (Fig. 1, element 21) including a plurality of sheet members (Fig. 1, elements 1a-1d) laminated one on the other in a stacked direction,
- a plurality of drive electrodes (Fig. 1, element 12a) corresponding to the pressure chambers, and a plurality of common electrodes (Fig. 1, elements 2 and 3), the plurality of drive electrodes and the plurality of common electrodes being arranged in alternation with respect to the stacked direction, each of the drive electrodes and the common electrodes being sandwiched between corresponding sheet members (Column 3, lines 8-31),
- wherein portions of the sheet members sandwiched between the drive electrodes and the common electrodes serve as active portions that selectively eject ink droplets from the corresponding pressure chambers through the nozzles (Column 5, lines 36-64),

- wherein projected contours of all the drive electrodes (Figures 1 and 9, element 12A) fall within a projected contour of one of the common electrodes (Figures 1 and 9, element 2) disposed closest to the cavity unit (Fig. 1, element 22) with respect to the stacked direction.

With respect to claim 2, Takahashi discloses the plurality of pressure chambers (Fig. 3, element 5) are aligned in a first direction (Fig. 3, element C) perpendicular to the stacked direction;

- each of the drive electrodes (Fig. 3, element 12) has a length greater than the corresponding pressure chamber in a second direction (Fig. 3, orthogonal to element C) perpendicular to both the first direction and the stacked direction,
- each drive electrode having a protruding portion protruding beyond the pressure chamber in the second direction Figure 9, element 12a);
- the sheet members include first sheet members (Fig. 1, element 1a) and second sheet members (Fig. 1, element 1d), each first sheet member being provided with the drive electrodes (Fig. 1, element 12a) on a surface, each second sheet member being provided with one of the common electrodes (Fig. 1, element 2) on a surface;
- the actuator further includes a plurality of dummy drive electrodes (Fig. 1, element 11a) and conductive members, (Column 4, lines 29-55, element 11c) the plurality of dummy drive electrodes being formed on the surface of each second sheet member (Fig. 6 and Column 4, lines 29-55), except the second sheet member closest to the cavity unit, and

Art Unit: 2853

- corresponding to the protruding portions of the drive electrodes (Fig. 9, element 12a), the conductive members (Fig. 6, element 12c) extending in the stacked direction to electrically connect the dummy drive electrodes (Column 4, lines 29-55, element 11c) to the corresponding protruding portions; and
- the projected contours of all the drive electrodes (Figures 1 and 9, element 12A) including the protruding portions fall within the projected contour of the one of the common electrodes (Figures 1 and 9, element 2) disposed closest to the cavity unit with respect to the stacked direction.

With respect to claim 3, Takahashi discloses the common electrodes (Fig. 10, elements 2, 3) have at least one lead-out portion (Fig. 10, elements +, GND), and

- the actuator (Fig. 1, element 21) further includes a plurality of dummy common electrodes (Fig. 10, elements 3, GND) each formed on the surface of each first sheet member (Fig. 10, element 1a) to correspond to the lead-out portions of the common electrodes (Fig. 10, elements 2, GND),
- the conductive members extending in the stacked direction to electrically connect (Fig. 10, element GND) the dummy common electrodes to the lead-out portions of the common electrodes.

With respect to claim 4, Takahashi discloses the plurality of pressure chambers (Fig. 3, element 5) are aligned in a plurality of rows each extending in the first direction (Fig. 3, element C);

Art Unit: 2853

- the plurality of drive electrodes (Fig. 3, element 12a) are aligned in a plurality of rows each extending in the first direction (Fig. 3, element C) in correspondence with the pressure chambers (Fig. 3, element 5);
- the protruding portions of the drive electrodes (Fig. 3, element 12a) protrude outward beyond the pressure chambers in the second direction (Fig. 3, orthogonal to element C);
- the common electrodes (Fig. 9, element 2) are band-shaped common electrodes extending in the first direction; and
- the plurality of dummy drive electrodes (Fig. 9, element 11a) are aligned in the first direction along both sides of the band-shaped common electrodes except the one of the common electrodes closest to the cavity unit.

With respect to claim 5, Takahashi discloses a cavity unit (Fig. 1, element 22) that is attached to one of the second sheet members (Fig. 1, element 1d).

With respect to claim 9, Takahashi discloses the sheet members (Fig. 1, elements 1a-1d) are piezoelectric ceramic sheets (Column 3, lines 8-31).

With respect to claim 10, Takahashi discloses the drive electrodes (Fig. 1, element 12a) located closest to the cavity unit (Fig. 1, element 22) confront the cavity unit with more than one of the sheet members (Fig. 1, elements 1a-1d) interposed between the plural ones of the drive electrodes and the cavity unit.

With respect to claim 11, Takahashi discloses a frame that supports the inkjet head (Fig. 1, element 100). Although the frame is not expressly disclosed, a frame would

necessarily be present in order for the inkjet head to record on an image media substrate.

With respect to claim 12, Takahashi discloses the plurality of pressure chambers (Fig. 3, element 5) are aligned in a first direction (Fig. 3, element C) perpendicular to the stacked direction;

- each of the drive electrodes (Fig. 3, element 12a) has a length greater than the corresponding pressure chamber in a second direction (Fig. 3, orthogonal to element C) perpendicular to both the first direction and the stacked direction,
- each drive electrode (Fig. 9, element 12a) having a protruding portion protruding beyond the pressure chamber in the second direction;
- the sheet members include first sheet members (Fig. 1, element 1a) and second sheet members (fig. 1, element 1d), each first sheet member being provided with the drive electrodes (Fig. 1, element 12a) on a surface, each second sheet member being provided with one of the common electrodes (Fig. 1, element 2) on a surface;
- the actuator further includes a plurality of dummy drive electrodes (Fig. 1, element 11a) and conductive members (Column 4, lines 29-55, element 11c), the plurality of dummy drive electrodes being formed on the surface of each second sheet member, except the second sheet member closest to the cavity unit, and
- corresponding to the protruding portions of the drive electrodes (Fig. 9, element 12a), the conductive members extending in the stacked direction to electrically connect the dummy drive electrodes to the corresponding protruding portions;

- and the projected contours of all the drive electrodes (Figures 1 and 9, element 12A) including the protruding portions fall within the projected contour of the one of the common electrodes (Figures 1 and 9, element 2) disposed closest to the cavity unit (Fig. 1, element 22) with respect to the stacked direction.

With respect to claim 13, Takahashi discloses the common electrodes (Fig. 10, elements 2, 3) have at least one lead-out portion (Fig. 10, elements +, GND), and

- the actuator (Fig. 1, element 21) further includes a plurality of dummy common electrodes (Fig. 10, elements 3, GND) each formed on the surface of each first sheet member (Fig. 10, element 1a) to correspond to the lead-out portions of the common electrodes (Fig. 10, elements 2, GND),
- the conductive members (Fig. 10, element GND) extending in the stacked direction to electrically connect the dummy common electrodes to the lead-out portions of the common electrodes.

With respect to claim 14, Takahashi discloses the plurality of pressure chambers (Fig. 3, element 5) are aligned in a plurality of rows each extending in the first direction (Fig. 3, element C);

- the plurality of drive electrodes (Fig. 3, element 12a) are aligned in a plurality of rows each extending in the first direction (Fig. 3, element C) in correspondence with the pressure chambers;
- the protruding portions of the drive electrodes (Fig. 3, element 12a) protrude outward beyond the pressure chambers in the second direction (Fig. 3, orthogonal to element C);

Art Unit: 2853

- the common electrodes (Fig. 9, element 2) are band-shaped common electrodes extending in the first direction; and
- the plurality of dummy drive electrodes (Fig. 3, element 11a) are aligned in the first direction along both sides of the band-shaped common electrodes except the one of the common electrodes closest to the cavity unit.

With respect to claim 15, Takahashi discloses a cavity unit (Fig. 1, element 22) that is attached to one of the second sheet members (Fig. 1, element 1d).

With respect to claim 19, Takahashi discloses sheet members that are piezoelectric ceramic sheets (Column 3, lines 8-31).

With respect to claim 20, Takahashi discloses the plural ones of the drive electrodes (Fig. 1, element 12a) located closest to the cavity unit (Fig. 1, element 22) confront the cavity unit with more than one of the sheet members (Fig. 1, elements 1a-1d) interposed between the plural ones of the drive electrodes and the cavity unit.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-8 and 18 are rejected under 35 U.S.C. 103(a) as being obvious over Takahashi (US 6,655,790 B2) in view of Shimada et al. (US 6,378,996 B1).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

With respect to claims 6-8 and 18 Takahashi discloses the inkjet head where the cavity unit (fig. 1, element 22) is attached to one of the second sheet members (Fig. 1, element 1d).

Takahashi fails to disclose attaching the cavity unit to one of the second sheet members using an adhesive, through holes penetrating through the portions of the drive electrodes, and a flexible cable.

Shimada discloses "the nozzle plate in which the nozzle orifices are bored is fixed by adhesive agent or the like on the surface of the passage-forming substrate where the piezoelectric elements are formed" (Column 12, lines 21-25), "the lead electrodes and the drive circuit are electrically connected respectively through connection holes provided in a region, which opposes the drive circuit, of the elastic film" (Column 8, lines 42-49), and "on the passage-forming substrate, connection wirings that connect the drive circuit and external wiring such as FPC are formed in the vicinity of the end portion in the direction where the pressure generating chambers 12 are parallelly provided" (Column 17, lines 8-16).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to use the inkjet head features of Shimada in the print head of Takahashi. The motivation for doing so would have been to provide an inkjet recording head that is capable of improving the rigidity of the compartment wall and arranging the pressure generating chambers in high density (Column 2, lines 17-22).

Claim 16 is rejected under 35 U.S.C. 103(a) as being obvious over Takahashi (US 6,655,790 B2) in view of Moynihan et al. (US 5,605,659).

Takahashi discloses the inkjet head where the cavity unit (fig. 1, element 22) is attached to one of the second sheet members (Fig.1, element 1d).

Takahashi fails to disclose using a non-ink-permeable and electrically insulative adhesive.

Moynihan discloses "an epoxy adhesive can be used to mount not only the piezoelectric plate, but also the orifice plate, to the opposite surfaces of the carbon

body. For this purpose, one of the surfaces of the plates to be joined is preferably spray-coated with a layer of B-stage epoxy adhesive about 2 microns thick before the piezoelectric plate 23 or the orifice plate is applied to it" (Column 9, lines 35-60)

At the time of the invention, it would have been obvious to use the adhesive discloses by Moynihan in the print head of Takahashi. The motivation for doing so would have been "such a thin layer of epoxy adhesive provides excellent seals between the plates, including the very narrow portions between the orifice passages, but does not flow into the passages or apertures in such a way as to interfere with the operation of the head" (Column 9, lines 35-60).

Claim 17 is rejected under 35 U.S.C. 103(a) as being obvious over Takahashi (US 6,655,790 B2) in view of Utsumi et al. (US 4,766,671).

Takahashi discloses the inkjet printer having sheet members (Fig.1, elements 1a-1d).

Takahashi fails to disclose through holes penetrating through the protruding portions of the drive electrodes and the dummy drive electrodes, the through holes being filled with conductive past, the conductive past serving as the conductive members.

Utsumi discloses "the connections of the electrodes are performed along the stacking direction as follows. Through holes are formed at the centers of the terminals so as to extend through the ceramic layers. Before or after the laminated body of the ceramic layers is sintered, a conductive paste is filled in the through holes" (Column 15, lines 25-31).

At the time of the invention, it would have been obvious for one of ordinary skill in the art to use the through holes disclosed by Utsumi in the print head of Takahashi. The motivation for doing so would have been to achieve electrical connection of the electrodes (Column 15, lines 15-31).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Pasch (US 5,872,026) discloses a "non-permeable, non-electrically conductive adhesive, which may be a conventional insulating epoxy resin" (Column 4, lines 62-67).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is (571) 272-2810. The examiner can normally be reached on 7am - 330pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2853

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GSM
3/15/2005

GM



MANISH S. SHAH
PRIMARY EXAMINER